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POST-TREATMENT EVALUATION OF THE CONE AND SEED INSECT CONTROL PROJECT AT ERAMBERT ORCHARD, BROOKLYN, MISSISSIPPI, DURING 1980

by

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Abstract

A post-treatment evaluation was conducted at the Erambert Federal Seed Orchard during 1980 to evaluate the use of Guthion[3/] applied by mist blower to control coneworms and seedbugs. Results showed that selected single trees from various seed sources treated with Guthion had 15 to 61 percent coneworm damage compared to 32 percent for 6 check trees from the Alabama loblolly source. Four times more seed per cone was produced on Guthion treated trees from the southern Mississippi loblolly source than was produced on untreated trees. A benefit:cost analysis showed $3.11 gained in additional seed produced for every dollar spent for insect control on the southern Mississippi source.

INTRODUCTION

A post-treatment evaluation of the cone and seed insect control project at the Erambert Orchard, Brooklyn, Mississippi, as required by FSM 2155.3 was conducted during 1980 by Alexandria Field Office, Forest Pest Management personnel.

The purpose of the evaluation was to evaluate mist blower applied Guthion to control coneworms and seedbugs at the orchard.

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2/ The author thanks Jerry Larson and staff at the Erambert Orchard for collecting cones for the analysis.

3/ Use of trade names does not constitute an endorsement by the USDA Forest Service. Other products with the same ingredients may be equally effective.

METHODS

Treatments

The Guthion treatment on areas sampled consisted of 4 sprays of Guthion 2S (14 liters/379 liters or 30 pts/100 gal H_2O emulsion) sprayed using a mist blower at the rate of 1 gal (3.8 liters) per tree. Treatment dates, areas sprayed, and number of sprays used on the orchard during 1980 are shown on the map (fig. 1).

Cone Damage Assessment

Cones were collected from single trees treated with Guthion from the Alabama, northern Mississippi and southern Mississippi loblolly seed sources. Cones from each tree were examined for insect damage.

Seed Damage Assessment

Two ramets of 6 clones were selected from both a Guthion treated area and a check area within the Alabama and southern Mississippi loblolly blocks, and from a Guthion treated area within the northern Mississippi blocks. Six cones were selected from each ramet for seed analysis. In the southern Mississippi source all cones were completely dissected and seeds counted, x-rayed and categorized as follows: first year aborted ovules, second year aborted ovules, sound seeds, empty seeds, seedbug damaged seeds and malformed seeds. On the other sources all seeds that would shake loose by tapping cones several times on a hard surface were x-rayed. Seeds were categorized under the same categories as were seeds from the southern Mississippi loblolly source except first and second year aborted ovules were not counted.

Dr. Neel's Test

Data collected by Dr. W. W. Neel of Mississipi State University from 1 ramet of 6 clones from both the Guthion treated trees and the untreated trees in the Alabama loblolly check area were included for comparison.

On Dr. Neel's test, Guthion treated trees were sprayed using a hydraulic sprayer. Treatments were applied at monthly intervals (5 applications) starting in mid-May and ending in mid-September. The dosage rate of Guthion was 0.18% ai or 6 pints Guthion 2S to 100 gallons of water (2.8 liters Guthion to 379 liters H_2O). Trees were sprayed to runoff. All cones were collected from study trees and assessed for damage. Six cones were randomly selected from each tree and assessed for seed damage as was done for the southern Mississippi loblolly source above.

how were they selected

2.

Analysis of variance and multiple range tests comparing treatments within the same seed source (southern Mississippi and Alabama loblolly) were run for the following variables: numbers of sound seeds per cone, percentage of total sound seed, percentage of total empty seed, percentage of seedbug damaged seeds and percentage of malformed seed. Additionally, the number of first year aborted ovules per cone, the number of second year aborted ovules

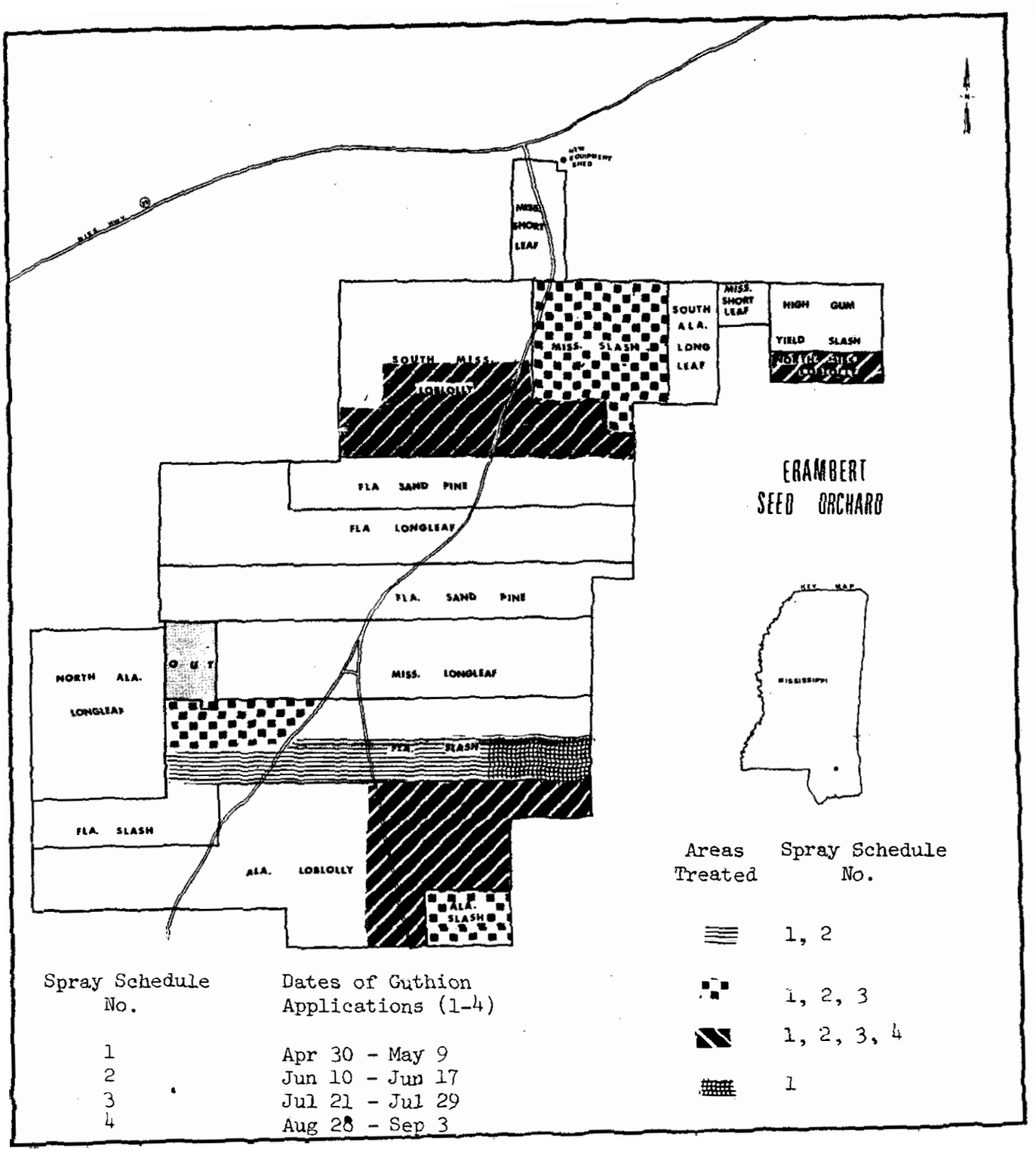

Figure 1. Erambert Orchard showing areas and dates sprayed with Guthion® during 1980.

per cone, the total number of first and second year aborted ovules per cone and seed efficiency were analyzed for the southern Mississippi loblolly source.

RESULTS

Cone Damage

Coneworm damage varied from 15 percent on treated trees from the Alabama and northern Mississippi loblolly sources to 61 percent on the southern Mississippi loblolly source (table 1). Dr. Neel's data from the Alabama loblolly source showed 32 percent coneworm damage on the untreated trees and 21 percent coneworm damage on the Guthion treated trees. Results of Dr. Neel's test showed no significant difference ($P = 0.05$) in coneworm damage between Guthion treated trees and check trees.

Seed Damage

Approximately 4 times more seed per cone was produced on the Guthion treated trees in the southern Mississippi loblolly source than on untreated trees (table 2). Guthion treated trees had significantly ($P = 0.01$) greater numbers of sound seeds per cone, greater percentage of sound seeds, lower percentage of seedbug damaged seeds and higher seed efficiency. Guthion treated trees also had a significantly ($P = 0.05$) lower percentage of the following: empty seeds, seedworm damaged seeds and seedbug damaged seeds.

There was no significant difference between results of the Guthion treatment and the check treatment for any of the response variables analyzed for seed from the Alabama loblolly source (table 3). Guthion treated trees had 21 sound seeds per cone while check trees had 8 sound seeds per cone. These figures were both low compared to the 62 sound seeds per cone for Guthion treated trees on the southern Mississippi source.

A benefit:cost analysis for the southern Mississippi loblolly seed source showed $3.11 worth of additional seed produced for each dollar spent for insect control (table 4).

DISCUSSION

Considerable coneworm damage occurred in selected single Guthion treated trees at the orchard. The tree from the southern Mississippi loblolly source with 61 percent damage had a large bushy crown which was difficult to penetrate with sprays.

Why was this tree selected

Dr. Neel's test showed a higher number of sound seeds per cone on both Guthion treated trees and check trees than on trees in these respective treatments in the USDA Forest Service evaluation on the Alabama loblolly source. The larger number of sound seeds was probably due to the method of extraction rather than to other reasons. Seed data from Dr. Neel's test have not yet been statistically analyzed.

Table 1. Cone damage, loblolly pine, Erambert Orchard, Mississippi, 1980.

LOBLOLLY	TREATMENT	NO. OF TREES SAMPLED	PERCENT		
			HEALTHY	CONEWORM	OTHER
Alabama	Check[1/]	6	68 a [3/]	32 a	0
Alabama	Guthion 2S (5 sprays)[1/]	6	79 a	21 a	0
Alabama	Guthion 2S (4 sprays)[2/]	1	85	15	0
N. Mississippi	Guthion 2S (4 sprays)[2/]	1	83	15	0
S. Mississippi	Guthion 2S (4 sprays)[2/]	1	33	61	6

1/ Dr. Neel's field test using a hydraulic sprayer. Trees were sprayed to runoff with Guthion mixed at 6 pints/100 gallons of water (2.8 l Guthion/379 l H_2O). 5 applications

2/ One gal (3.8 l) of 30 pints/100 gal Guthion 2S water mixture per tree sprayed by mist blower. 1 application

3/ Means not followed by the same letter are significant at the 5% level of significance.

Table 2. Seed data, southern Mississippi loblolly pines, Erambert Seed Orchard, 1980.

TREATMENT	NUMBER				PERCENT					
	1st yr. Aborted Ovules	2nd yr. Aborted Ovules	Total Aborted Ovules	Sound Seeds/ Cone	Sound Seed	Empty Seeds	Seedbug	Seedworm	Malformed	Seed Efficiency
Guthion 2S[1/]	53 a[3/]	3 a[3/]	56 a[3/]	62 a[2/]	63 a[2/]	22 a[3/]	8 a[2/]	2 a[3/]	5 a[3/]	40 a[2/]
Check	59 a	2 a	61 a	15 b	16 b	37 b	37 b	7 b	3 a	9 b

1/ One gal (3.8 l) of 30 pints Guthion 2S/100 gal water emulsion (14 1/379 l H_2O) sprayed per tree using a mist blower (4 sprays).

2/ Treatment means not followed by the same letter are significantly different from one another at the 1 percent level of significance.

3/ Treatment means not followed by the same letter are significantly different from one another at the 5 percent level of significance.

Table 3. Seed data, Alabama and north Mississippi loblolly pines, Erambert Orchard, Brooklyn, Mississippi, 1980.

LOBLOLLY	TREATMENT	NO. SOUND SEED/CONE	PERCENT				
			SOUND SEEDS	EMPTY	SEEDBUG	SEEDWORM	MALFORMED
Alabama	Guthion 2S[1/]	21 a[2/]	78 a	18 a	3 a	1 a	0 a
Alabama	Check	8 a	68 a	19 a	11 a	2 a	0 a
Alabama	Guthion 2S[3/]	48	59	37	1	3	0
Alabama	Check	14	26	67	2	3	0
N. Mississippi	Guthion 2S	31	71	23	5	1	0

1/ Means not followed by the same letter are significant at the 5% level of significance.

2/ One gal (3.8 l) of 30 pints of Guthion 2S/100 gal water emulsion (14 l/379 l H_2O) sprayed per tree using a mist blower (4 sprays).

3/ Five sprays at monthly intervals beginning in mid-May using 6 pints Guthion 2S/100 gal of water emulsion (2.8 l/379 l H_2O) applied to runoff by hydraulic sprayer.

Table 4. Benefit cost analysis for the southern Mississippi loblolly seed source.[1/]

Treatment	Cost of Treatment	lbs of Seed (kg)	Value of one lb of Seed[2/]	Total Value of Seed Produced	Benefit Cost[3/]
Guthion 2S	$6,520	53.6 (24.3)	$506.73	$27,161	$3.11:1
Check	0	13.6 (6.2)	506.73	6,892	--

1/ Calculations in appendix.

2/ Value of seed based on gross increase in profit based on a 55 year rotation age assuming a 15% genetic gain (volume, quality, resistance to insects and diseases) using orchard seed instead of woods run seed. A ten percent discount rate (OMB) was used.

3/ Benefit cost = $\frac{\text{value of seed produced with treatment - value of seed without treatment.}}{\text{Cost of treatment}}$

As a whole, more seeds per cone were produced on Guthion treated trees than check trees. Many of the cones collected for the evaluation were sampled early in the harvest season and did not open completely. Where cones were completely dissected, many more sound seeds per cone were found. Also, more insect damaged seeds were dislodged from dissected cones than from cones that were hit to dislodge their seeds. Therefore, complete dissection is a better means to compare the effectiveness of treatments.

RECOMMENDATIONS

1) Better timing of applications for coneworm control when using Guthion should be investigated by Forest Pest Management and orchard personnel. This could be done by comparing different application dates and/or by using pheromone traps when available.

2) Many trees on the orchard are becoming too tall for adequate spray coverage by ground application; aerial applications of pesticide should be considered where foliar application is desired.

3) A post-treatment evaluation comparing Furadan, Guthion and check treatments on slash and loblolly pine sources should be conducted during FY 1981.

APPENDIX

Formula for calculation potential pounds of seed produced

$$\sum_{1}^{t} \frac{(SS_t)}{(100)} + \frac{(TA_t)}{(100)} X = Y$$

(SS_t) = percent sound seeds

(TA_t) = percent acreage treated

$t_1, t_2 \ldots t_n$ - treatments 1 through n

X = potential seed production if all seeds with seed coats survived

Y = total pounds of seed actually produced on the seed source

Y = 67 lbs

CALCULATIONS

Guthion		Check	
$\frac{(63)}{(100)} \frac{(50)}{(100)} X$	+	$\frac{(16)}{(100)} \frac{(50)}{(100)} X$	= 67 lbs

X = 170 lbs

(.63)(.50)(170) = 53.6 lbs (24.3 kg)

(.16)(.50)(170) = 13.6 lbs (6.2 kg)

PRECAUTIONARY STATEMENT

Pesticides used improperly can be injurious to man, animals, and plants. Follow the directions and heed all precautions on the labels.

Store pesticides in original containers under lock and key out of reach of children and animals and away from food and feed.

Apply pesticides so that they do not endanger humans, livestock, crops, beneficial insects, fish and wildlife. Do not apply pesticides when there is danger of drift, when honey bees or other pollinating insects are visiting plants, or in ways that may contaminate water or leave illegal residues.

Avoid prolonged inhalation of pesticide sprays or dusts; wear protective clothing.

If your hands become contaminated with a pesticide, wash them immediately with soap and water. In case a pesticide is swallowed or gets in the eyes, follow the first aid treatment given on the label, and get prompt medical attention. If a pesticide is spilled on your skin or clothing, remove the clothing immediately and wash skin thoroughly. After handling or spraying pesticides, do not eat or drink until you have washed with soap and water.

Do not clean spray equipment or dump excess spray material near ponds, streams or wells. Because it is difficult to remove all traces of herbicide from equipment, do not use the same equipment for insecticides or fungicides that you used for herbicides.

Dispose of empty pesticide containers promptly. Have them buried at a sanitary landfill dump, or crush and bury them in a level, isolated place.

NOTE: Some states have restrictions on the use of certain pesticides. Check your state and local regulations. Also, because registrations of pesticides are under constant review by the U.S. Environmental Protection Agency, consult your county agent, state extension specialist or FPM to be sure the intended use is still registered. For further information or assistance, contact Forest Pest Management, Alexandria Field Office, Pineville, La., 71360, (Telephone: FTS 497-7280, or Commercial 318/473-7280).